Adaptation and psychometric properties of the ISPCAN Child Abuse Screening Tool for use in trials (ICAST-Trial) among South African adolescents and their primary caregivers

Child Abuse & Neglect 82 (2018) 45–58

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

Adaptation and psychometric properties of the ISPCAN Child Abuse Screening Tool for use in trials (ICAST-Trial) among South African adolescents and their primary caregivers

Franziska Meinck[a,b,*], Mark E. Boyes[c], Lucie Cluver[a,d], Catherine L. Ward[e], Peter Schmidt[f], Sachin DeStone[g], Michael P. Dunne[h]

[a] Centre for Evidence-Based Intervention, Department of Social Policy & Intervention, University of Oxford Barnett House, 32 Wellington Square, Oxford, OX1 2ER, United Kingdom
[b] OPTENTIA, Faculty of Health Sciences, North-West University, 1174 Hendrick Van Eck Boulevard, 1900 Vanderbijlpark, South Africa
[c] Faculty of Health Sciences, School of Psychology, Curtin University, Perth, Australia
[d] Department of Psychiatry and Mental Health, University of Cape Town, Cape Town, South Africa
[e] Department of Psychology and Safety and Violence Initiative, University of Cape Town, Cape Town, South Africa
[f] Institut für Politikwissenschaft, Justus-Liebig-Universität Gießen, Gießen, Germany
[g] Warwick Medical School, University of Warwick, Coventry, United Kingdom
[h] School of Public Health and Social Work, Faculty of Health, Queensland University of Technology, Brisbane, Australia

ARTICLE INFO

Keywords:
Child abuse
Child maltreatment
Sexual abuse
Measure development
Measure validation
Psychometrics

ABSTRACT

Child abuse prevention research has been hampered by a lack of validated multi-dimensional non-proprietary instruments, sensitive enough to measure change in abuse victimization or behavior. This study aimed to adapt the ICAST child abuse self-report measure (parent and child) for use in intervention studies and to investigate the psychometric properties of this substantially modified tool in a South African sample. First, cross-cultural and sensitivity adaptation of the original ICAST tools resulted in two preliminary measures (ICAST-Trial adolescents: 27 items, ICAST-Trial caregivers: 19 items). Second, ICAST-Trial data from a cluster randomized trial of a parenting intervention for families with adolescents (N = 1104, 552 caregiver-adolescent dyads) was analyzed. Confirmatory factor analysis established the hypothesized 6-factor (adolescents) and 4-factor (caregivers) structure. Removal of two items for adolescents and five for caregivers resulted in adequate model fit. Concurrent criterion validity analysis confirmed hypothesized relationships between child abuse and adolescent and caregiver mental health, adolescent behavior, discipline techniques and caregiver childhood abuse history. The resulting ICAST-Trial measures have 25 (adolescent) and 14 (caregiver) items respectively and measure physical, emotional and contact sexual abuse, neglect (both versions), and witnessing intimate partner violence and sexual harassment (adolescent version). The study established that both tools are sensitive to measuring change over time in response to a parenting intervention. The ICAST-Trial should have utility for evaluating the effectiveness of child abuse prevention efforts in similar socioeconomic contexts. Further research is needed to replicate these findings and examine cultural appropriateness, barriers for disclosure, and willingness to engage in child abuse research.

* Corresponding author at: Department of Social Policy and Intervention, Oxford University, Oxford, OX1 2ER, United Kingdom.
E-mail addresses: franziska.meinck@spi.ox.ac.uk (F. Meinck), mark.boyes@curtin.edu.au (M.E. Boyes), lucie.cluver@spi.ox.ac.uk (L. Cluver), Catherine.Ward@uct.ac.za (C.L. Ward), peter.schmidt@sowi.uni-giessen.de (P. Schmidt), s.de-stone@warwick.ac.uk (S. DeStone), m.dunne@qut.edu.au (M.P. Dunne).

https://doi.org/10.1016/j.chiabu.2018.05.022
Received 12 January 2018; Received in revised form 24 April 2018; Accepted 26 May 2018
Available online 31 May 2018

1. Background

An estimated 1 billion children are victims of violence every year (Hillis, Mercy, Amobi, & Kress, 2016). Childhood abuse exposure is associated with long-term negative physical, mental and reproductive health outcomes which last into adulthood (Maniglio, 2009; Norman et al., 2012). Evidence of the effects of child abuse victimization on health shows severe negative outcomes independent of country, society and culture (Almuneef, Qayad, Aleissa, & Albuhairan, 2014; Felitti et al., 1998; Oladeji, Makanjoula, & Gureje, 2010; Tran, Dunne, Vo, & Luu, 2015). In order to reduce children's victimization, we need to test abuse-prevention interventions in rigorous randomized and quasi-experimental studies. Moreover, the global community recognizes the need for evidence-based interventions in both high and low-income settings (WHO, 2014). In order to test whether these interventions are effective, it is essential to have validated and reliable measures of whether abuse is really diminishing.

There are several well-validated multidimensional tools for measurement of child maltreatment, including the Parent-Child Conflict Tactics Scale (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) and the Childhood Trauma Questionnaire (Bernstein & Fink, 1997). These tools are copyrighted and require payment for use. They are complemented by several non-proprietary questionnaires and screening tools to establish the prevalence of child abuse and neglect (Meinck, Steinert, et al., 2016) but not much is known yet about the validity and psychometric properties of these latter instruments (Finkelhor, Ji, Mikton, & Dunne, 2013) and none have been developed or substantially adapted for research in sub-Saharan Africa. A well-recognized and established questionnaire is the International Society for the Prevention of Child Abuse and Neglect (ISPCAN) Child Abuse Screening Tool (ICAST). It is a non-proprietary, multi-dimensional measure assessing the lifetime and past-year prevalence of physical, emotional and sexual abuse and neglect of children using parent (ICAST-P) or adolescent (ICAST-C) self-report for current (past-year) and lifetime child abuse (Runyan et al., 2009; Zolotor et al., 2009). The ICAST has thus far been used in multiple studies across the globe and is available in 20 languages. For adolescents, the ICAST-C measures frequency of physical and emotional abuse and neglect by caregivers, sexual harassment and contact sexual abuse involving anyone, and violence exposure in the household. For caregivers, the ICAST-P measures the frequency of the caregiver's use of physical and emotional violence on the index child, neglectful incidents, and known exposure of the child to contact sexual abuse. The original ICAST-C has 38 items; the ICAST-P has 34 items.

The ICAST was specifically developed for use across cultures and languages. It is particularly suited to international contexts as the ICAST manual prescribes in-depth qualitative work and appropriate adaptation prior to utilization in population samples in order to ensure cultural sensitivity (Runyan, Brandspigel, Zolotor, & Dunne, 2015). This is because child rearing and disciplinary practices that are accepted by one group may not be accepted by another and their use will therefore differ vastly between these groups (Korbin, 1980).

Based on a number of studies around the world, there is emerging evidence about the cultural sensitivity, validity and internal consistency of the ICAST. Initial psychometric analyses on the ICAST-C have been carried out. These suggest good internal consistency (Cronbach's alpha (α) > .70) for the physical abuse, psychological abuse, sexual abuse and neglect sub-scales and fair internal consistency (α = .69) for the violence exposure scale across a multi-country sample including 571 adolescents from Colombia, India, Russia and Iceland (Zolotor et al., 2009). Studies with 1142 adolescents in Romania (Iovu, 2012), 42,194 adolescents in nine Balkan countries (Nikolaidis et al., 2018), 1028 adolescents in Lebanon (Usta, Farver, & Danachi, 2012) and 5236 adolescents in Taiwan (Chang, Lin, Chang, Tsai, & Feng, 2013) show similar internal consistency for ICAST-C sub-scales. The Taiwanese study also examined construct validity of the dimensions neglect, violence exposure, psychological, physical and sexual abuse using confirmatory factor analysis. Model fit statistics suggested adequate fit with medium (r = .47) to large (r = .81) correlations among constructs except for sexual abuse and neglect (r = .23).

Only one study has thus far examined internal consistency of the ICAST-P in a multi-country sample with 697 parents in Colombia, Egypt, India, Lebanon, Malaysia, Russia and Democratic Republic of Congo (DRC) (Runyan et al., 2009). The study found good internal consistency for the physical discipline and psychological punishment sub-scales (α > .70). Internal consistency for the sexual abuse and neglect sub-scales was very poor (α < .40). These scales had two and three items respectively and yielded very few positive responses thus reducing variance, both of which can affect internal consistency. Qualitative investigations into cultural sensitivity of both ICAST measures suggest few needed adaptations and overall high levels of suitability in different cultural contexts with the possible exception of the sexual abuse items in some settings (Al-Eissa et al., 2015; Mitwalli et al., 2017; Silveira, da, & Grassi-Oliveira, 2016). No systematic test of metric and scalar invariance across different cultures, countries or time points has been undertaken (Brown, 2015).

The ICAST, and other child abuse measures, were designed for screening of populations, mainly to estimate the scale of the problem in different settings. Such tools do not require the same level of sensitivity to change as is needed to measure reductions in abusive behavior in intervention studies. Therefore, some researchers have made the unsatisfactory choice of using proxy measures for child abuse such as parental stress, child externalizing behavior, child abuse potential or attitudes towards corporal punishment (Mikton & Butchart, 2009). Although these factors are associated with child abuse they are not child abuse itself, and may reflect unrelated change in proxies rather than true variation in victimization. An additional consideration in low- and middle-income countries (LMICs) is that, unlike the ICAST suite of tools, many proxy instruments are proprietary and expensive, presenting a significant barrier to research (Ward, Sanders, Gardner, Mikton, & Dawes, 2016). Some studies use agency reports as their primary outcome; however, these tend to capture only the most severe incidents among children in high-risk families (Maier, Mohler-Kuo, Landolt, Schnyder, & Jud, 2013). Also, many agencies in LMICs are under-resourced, leaving the vast majority of abuse unrecorded (Sumner et al., 2015).

This three-phase study focuses on the development and validation of a child abuse measure, adapted from the ICAST, for use in intervention studies. The measure was tested in South Africa, a middle-income country (World Bank, 2018), where rates of child

maltreatment are high (Meinck, Cluver, Boyes, & Loening-Voysey, 2016, Ward, Artz, Leoschut, Kassanjee, & Burton, 2018) and no previous child abuse measure had either been developed or comprehensively adapted and validated, making it an ideal location to adapt and test such an instrument. The first phase entailed a quantitative pilot study to adapt the current gold-standard non-proprietary child abuse measure, the ISPCAN Child Abuse Screening Tool (ICAST) parent and child-report versions (Runyan et al., 2009; Zolotor et al., 2009) for use in intervention studies. The second phase used qualitative respondent debriefing to adapt the measure culturally for use in South Africa. The third phase psychometrically assessed and validated the new child abuse measure, the ICAST-Trial, within a sample of adolescents and their caregivers in the context of a parenting intervention evaluation.

2. Methods

The original ICAST tools measure lifetime and past-year exposure. A one-year reporting frame exceeds the duration of many intervention studies. The reporting time-frame was thus adapted to measure past month abuse exposure or perpetration of abusive behavior, with the additional benefit that shorter reporting periods have been shown to decrease the risk for recall bias (Faulbaum & Prüfer, 2009; Fergusson, Horwood, & Woodward, 2000). Response codes were adjusted from past year/lifetime measurement (once a week or more, several times a month, about once a month, several times a year, once or twice, not in the past year, never) to estimate the actual number of abusive incidents in the past month (0, 1, 2, 3, 4, 5, 6, 7, 8 +), in order to increase sensitivity to measurement of changes in exposure.

First, a *quantitative pilot pre-post study* of a parenting program to reduce abuse in families with adolescents was conducted in 2014 with 115 adolescent-caregiver dyads (n = 230) in South Africa's Eastern Cape, a province characterized by high levels of poverty, inequality, low levels of service delivery and high HIV prevalence (> 20%) (Eastern Cape Socio Economic Consultative Council, 2011). Participants from rural and peri-urban areas were referred by NGOs, chieftains and public services, or were identified through door-to door recruitment on the basis of family conflict or challenges in parenting adolescents. All families attended the Sinovuyo Teen intervention, a 12-week parenting support program. Standardized paper questionnaires in isiXhosa were completed by adolescents and primary caregivers before the start of the intervention and immediately after the final session with the help of local interviewers who had extensive training in asking sensitive questions, dealing with disclosures and working with vulnerable children. Further information regarding the procedures can be found in the pilot study publication (Cluver, Meinck, Yakubovich, et al., 2016). These data were used to examine response rates per item, distribution and changes in pre- and post-intervention scores.

Second, *respondent debriefing* was conducted following the guidelines provided by Martin (2004). Local isiXhosa-speaking interviewers (n = 4) with in-depth qualitative interview training completed interviews with 20 adolescents (aged 10–18) and 20 caregivers over a period of 30 days in early 2015 to improve and re-design the ICAST-Trial. The in-depth qualitative interview training was carried out by an experienced qualitative researcher. Interviewers were introduced to the questionnaire and a schedule of semi-structured questions to probe participants for responses without suggesting or leading their answers. They were taught about body language, facial expressions, tone of voice, keeping notes throughout the interview, engaging with participants in a non-judgmental way, encouraging shy participants to open up and making them feel at ease and so forth. They were also taught the principles of respondent debriefing. This was then practiced in role plays over a period of two weeks. Participants were recruited through a local partner organization and had not been involved in the first phase. Participants were asked to fill in a tablet-based version of the ICAST with the help of trained interviewers. They were then asked provide feedback on their interview experience in one-on-one sessions on ease of use, phrasing of questions, suitability of questions and suitability of the vignette. Participants were regularly reminded that their role was to help improve the measure and that there were no right or wrong answers. All participants received lunch as thanks for their help.

Third, *psychometric testing* of the ICAST-Trial caregiver and adolescent version was conducted in the context of a cluster randomized controlled trial (cRCT). The cRCT evaluated a 14-week parenting program to prevent and reduce physical and emotional child abuse and neglect among families with teenagers (Cluver, Meinck, Shenderovich, et al., 2016). The trial took place in 2015–2016 in the Eastern Cape of South Africa. A total of 552 Xhosa adolescents aged 10–18 and their primary caregivers were successfully recruited into the study with the help of local schools, chieftains, social services and through self-referral. Families were included if they were considered to be at risk of abuse, defined as family conflict in the past month. Primary caregivers were identified as such if the adolescents lived in the same dwelling as their primary caregiver for at least four nights per week. Data were collected on tablets with the help of trained interviewers using the Open Data Kit (Hartung et al., 2010). Data reported here stem from families interviewed at baseline, one month and 5 – 9 months after the intervention. Further information regarding the procedures can be found in Cluver, Meinck, Shenderovich, et al. (2016).

2.1. Ethical procedure

Ethical approval was given by the review boards of the Universities of Oxford (SSD/CUREC2/11-40) and Cape Town (PSY2013-46) and by the Eastern Cape Provincial Government Departments of Social Development and Education in South Africa. Voluntary written consent was obtained from both adolescents and their primary caregiver for all study phases. Participants in the quantitative phases of the study received a small package containing stationery (adolescents), toiletries and soap (caregivers) as a thank you for taking part. Participants in the qualitative phase received a hot lunch. Confidentiality was maintained throughout the study, except when participants were at risk of significant harm or asked for assistance. In these cases, concerns were discussed with participants immediately after the interview. In total, 31 referrals with follow-up support to child protective or health services were made for adolescents due to rape, severe physical or emotional abuse, poor health or suicidal ideation.

Utmost care was taken to ensure privacy and confidentiality during the interview process. Interviewers were specifically trained to work with vulnerable adolescents and caregivers and in dealing with disclosure, privacy and confidentiality. Different interviewers were assigned to caregivers and adolescents, and interviews were carried out in secluded spots which guaranteed privacy such as the back of a car or an empty classroom. In the pilot study, interviewers guided participants through a paper questionnaire. In the cRCT, tablets were used for data collection and Audio Mobile Assisted Interviewing (AMASI) with headphones was used for sensitive sections such as those on abuse.

2.2. Measures used in the randomized trial

Child abuse victimization. Was measured using the ICAST-Trial tools for adolescents and caregivers (as described above).

Hypothesized correlates of child abuse victimization. Were based on a recent systematic review of health outcomes associated with multiple Adverse Childhood Experiences (Hughes et al., 2017).

Measures of health and behavior. *Symptoms of depression among adolescents* were measured using the Child Depression Inventory short form (CDI-S; α = .65) (Kovacs, 1985), used previously with similar populations in South Africa (Cluver, Gardner & Operario, 2007). Caregiver depressive symptoms were measured using the Centre for Epidemiologic Studies Depressions Scale (CES-D; α = .77) (Radloff, 1977), previously used in South Africa with similar populations (Kuo, Operario, & Cluver, 2012). *Adolescents' suicidal ideation* was measured using the Mini International Neuropsychiatric Interview for Children (MINI-KID; α = .87) (Sheehan, Shytle, & Milo, 2004) also previously used in South Africa with similar populations (Cluver, Orkin, Boyes, & Sherr, 2015). Adolescent *externalizing behavior* reported by caregivers and adolescents was measured using the Rule Breaking and Aggressive Behavior subscales of the Child Behavior Checklist (CBCL; α = .85) (Achenbach, 2000) which has also been used in South Africa with similar populations (Boyes & Cluver, 2013). *Caregiver childhood maltreatment* was measured using an adapted version of the ICAST retrospective self-report measure (ICAST-R; α = .68) (Dunne et al., 2009). *Caregiver substance use* was measured using three questions on past month alcohol and drug use. *Adolescent substance use* was measured using items from the WHO Global School-based Health Survey (WHO & CDC, 2015) investigating past month frequency of alcohol and drug use. *Harsh parenting* was measured using the 4-item Corporal Punishment subscale of the Alabama Parenting Questionnaire caregiver (α = .71) and child versions (APQ; α = .67) (Frick, 1991), previously used in South Africa with similar populations (Cluver, Meinck, Yakubovich, et al., 2016).

Socio-demographic characteristics. Included adolescent and caregiver age, gender, adolescent orphanhood, adolescent school enrollment, biological relationship between adolescent and caregiver, caregiver relationship status and educational levels. Poverty was measured using an index of access to the eight highest socially perceived necessities for children in South Africa which included e.g. three meals a day or clothes to keep you warm and dry (child version α = .71, caregiver version α = .71) (Barnes & Wright, 2012).

2.3. Analyses

Analysis of pilot data. Statistical analyses were conducted using STATA 14 (StataCorp, 2014). Descriptive statistics examined response rate and distribution of responses for each item for both caregivers and adolescents. As data were zero inflated and therefore not normally distributed, Wilcoxon signed-rank tests examined mean differences between scores at baseline and post-test. Only four data points were missing and therefore no imputations were conducted.

Analysis of debriefing data. Thematic analyses were conducted on participant responses. Initial codes were generated, and then sorted according to themes. Themes were considered significant when two or more participants had specified or identified an element within the ICAST that was culturally, contextually or cognitively problematic. This was then highlighted to the research group and adaptations were carried out with input from local interviewers.

Analysis of cRCT data. First, socio-demographic characteristics of the sample were described. Second, Simultaneous Confirmatory Factor Analysis (SCFA) (Brown, 2015) in MPlus 7 (Muthen & Muthen, 2012) was used to test the hypothesized six-factor structure of the ICAST-Trial consisting of physical abuse, emotional abuse, neglect, sexual harassment, contact sexual abuse and witnessing IPV among adolescents in the baseline data. SCFA is a CFA containing several latent variables as opposed to only one latent variable. It is employed to test for possible error correlations between items of different factors and for possible cross-loadings. Cross loading is when an indicator variable loads onto more than one latent variable. This can happen when more than one latent variable is identified by a single indicator variable. The data in question were non-normally distributed count data (range of the response scale: 0 – 8+). As these violated the normality assumptions, the MLR estimator was used. A hypothesized four-factor structure was tested among caregivers for physical, emotional, and sexual abuse and neglect using the baseline data. Multiple goodness of fit indices assessed model fit: Comparative Fit Index (CFI) and Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) and the standardized root mean square residual (SRMR). Each fit index referred to the models with the number of factors postulated above, and was calculated based on the assumptions of zero correlations among the measurement errors and no cross-loadings. Adequate model fit is given if the following cut-off values are reached: CFI and TLI are > .90 and RMSEA and SRMR are < .08 (Brown, 2015). Standardized item loadings below 0.4 were excluded from the scale (Bowen & Guo, 2012) and small modifications with regards to error correlations were made based on modification indices where there were plausible reasons for correlating the errors of two indicators (Brown, 2015). Third, internal consistency and concurrent criterion validity were tested. Cronbach's α and Raykov's rho (ρ) were used to assess internal consistency (Raykov, 2004). Concurrent criterion validity was assessed through correlations between reported child abuse and factors identified in systematic reviews of quantitative research (Hughes et al., 2017; Meinck, Cluver, Boyes, & Mhlongo, 2015). There were no missing data within the baseline survey. Finally, changes in mean abuse scores between baseline and immediate post-test (primary outcomes: physical and emotional abuse) and 5–9

month follow-up (secondary outcomes: witnessing IPV, neglect, sexual harassment and abuse) in relation to the intervention and control group were examined using Wilcoxon rank-sum tests. At 1-month post-intervention, 93% of adolescents (n = 512) and 92% of caregivers (n = 495) were retained. At 5–9months post-intervention, 96% of adolescents (n = 529) and 98% of caregivers (n = 540) were retained. Only those retained at follow-up were included in the analysis. The full trial results with intention to treat analyses are published elsewhere (Cluver et al., 2018).

3. Results

3.1. Phase 1: results of the quantitative pilot study

Questionnaires from 115 adolescents and their primary caregiver were collected. Adolescents were 49% female (mean age 14 years, SD 2.3). 29% were orphaned and 40% had poor health in the past month. Primary caregivers were 94% female (mean age 48 years, SD 13.6), 52% were the child's biological parent, 11% were employed and 50% reported experience of IPV in the past month. They did not have sufficient food in the home for an average of 1.8 days per week. Almost all (99%) families were Xhosa speaking.

Item-response. Questions about severe child abuse such as choking, burning, chaining or smothering had very low item-response rates in this study (< 2). They constitute types of abuse which are rare and very severe and it might not be necessary to include them in tools to measure common types of parental and peer-related maltreatment. One item focused on pulling hair elicited no response. Pulling hair is uncommon in South Africa as most African children have very short hair. These items were therefore removed from further versions of the questionnaire. Item-response rates for all other questions were non-normally distributed and zero inflated. Zero inflation happens in count data where zero is the most common value. In this case this means that the majority of participants stated that they experienced or carried out zero abusive events in the past month.

Sensitivity to change. Means and standard errors for all ICAST sub-scales for caregivers and adolescents are presented in Table 1 together with Wilcoxon signed-rank test results. The pilot study of the ICAST-Trial did not include a control group. The data show substantial reductions from baseline to post-test (taken immediately after the final intervention session) in physical and emotional abuse and neglect sum-scores using both caregiver and adolescent report. While these pilot data are insufficient to evaluate intervention effects, they indicate a change in respondent's responses at retest, and may indicate changes in actual experience.

Social desirability bias. The questionnaires for the pilot study were paper-based and completed with the assistance of interviewers. However, participant and interviewer feedback in the pilot phase suggested some social desirability bias due to the presence of interviewers - in line with previous research on sensitive topics (Gnambs & Kaspar, 2015). Participants in particular stated that they would feel more comfortable disclosing violent acts in private and this is reflected in a recent study from South Africa (Ward et al., 2018). Thus the decision was made to move to mobile assisted self-interviewing (MASI) for further studies with additional audio functionality (AMASI) for participants with low literacy.

3.2. Phase 2: adaptations to the measure – qualitative research

Twenty adolescents and their primary caregivers participated in the qualitative research. Half the adolescents were female as were all caregivers. Mean adolescent age was 14 years, mean caregiver age 50 years.

Modification of items. Items referring to twisting a child's ear and putting hot chili pepper in the child's mouth were removed as caregivers and adolescents in the qualitative piloting sessions stated that these acts were not common types of punishment or physical abuse in their area. Some items on physical abuse were regarded by respondents to be repetitive and thus items that distinguished between hitting on the buttocks and hitting elsewhere were combined into one item. One item, 'forced to have sex', was added because the original ICAST only measured attempted rape and this definition was considered by some interviewees to be too restrictive.

The majority of participants in the qualitative interviews indicated that they had misunderstood the original questions on neglect to mean financial inability to provide. In both adolescent and caregiver versions, neglect items were therefore amended to explicitly state that the neglectful behaviors occurred despite financial ability to provide. This distinction is particularly important for the

Table 1
Pilot data describing adolescent and caregiver reported outcomes at pre- and post-test for complete cases (N = 230).

	Adolescents (n = 115)				Caregivers (n = 115)			
Outcome	Pre-test	Post-test	*z*(*p*)	n	Pre-test	Post-test	*z*(*p*)	n
Physical abuse	1.10 (1.90)	.21 (.60)	−5.00 (< .001)	106	2.39 (4.10)	.57 (1.88)	−3.96 (< .001)	109
Emotional abuse	1.20 (2.43)	.37 (1.13)	−3.94 (< .001)	108	3.16 (4.10)	.95 (2.18)	−3.98 (< .001)	58
Neglect	.93 (2.16)	.19 (.88)	−3.59 (< .001)	107	.41 (.79)	.10 (.30)	−3.54 (< .001)	83
Sexual harassment	.08 (.33)	.07 (.39)	−.55 (.584)	107	–	–	–	–
Contact sexual abuse	.07 (.41)	.01 (.10)	−1.52 (.129)	109	.06 (.27)	.01 (.10)	−1.67 (.096)	107
Witnessing IPV	.70 (1.18)	.53 (1.13)	−1.25 (.212)	111	–	–	–	–

Data describes mean (standard deviation) Wilcoxon signed-rank test (*p*-value). N for complete cases varies based on the scale used, ranging from 58 to 111.

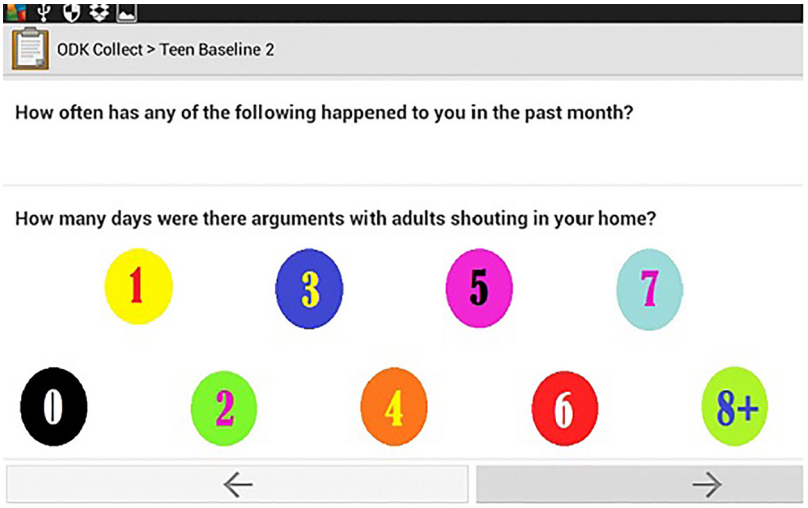

Fig. 1. Open Data Kit (ODK) screenshot of the first section of the ICAST-Trial adolescent version.

questionnaire's use in LMICs where the majority of a recruited sample may experience high levels of poverty.

The final adolescent questionnaire consisted of the following numbers of items: physical abuse (4), emotional abuse (8), sexual harassment (3), contact sexual abuse (4), witnessing IPV (2) and neglect (6). The final caregiver questionnaire consisted of the following number of items: physical abuse (6), emotional abuse (8), contact sexual abuse (2) and neglect (3). Supplement 1 and 2 detail the changes in the caregiver and adolescent questionnaires.

Adaptation of the vignette. During the piloting phase, adolescents requested vignettes they could relate to and that followed a story line. The original ICAST brief vignette was replaced with a more culturally relevant one following guidance by Auspurg and Hintz (2015) who suggested that short stories might increase respondents' ability to empathize or identify with the described people. All questions in the multi-component questionnaire thus used vignettes based on stories of two fictional friends: Sipho (male) and Thobeka (female). Caregivers also requested vignettes but wanted these to focus on normalizing discipline. Supplement 3 and 4 detail the complete ICAST-Trial questionnaires including vignettes.

Computer assisted interviewing and audio-computer assisted interviewing. The piloting sessions showed that whereas adolescents quickly learned how to operate the tablet, many older caregivers struggled with the touch-screen technology and needed tablet use tutorials from interviewers. The challenge was thus to develop an interface that was easy to use, appropriate for low levels of literacy, and smart enough to allow for high quality data collection. Multiple options were piloted and their qualities were discussed with participants. The final version contained differently colored buttons for each response option (e.g., a black button for "0", a yellow button for "1"; the numbers were also provided (see Fig. 1 for English version) making it easier to distinguish between numbers. An audio button option with headphones was available for those with low literacy. It utilized a calm, female voice as suggested during participant feedback. Constraints were included for all response options so that only one selection per question could be made.

3.3. Phase 3: psychometric evaluation of the ICAST-Trial utilizing data from a cluster randomized trial

Socio-demographic characteristics(Table 2). The adolescent sample was 41.3% female and had a mean age of 14 years. Caregivers were 94.7% female and had a mean age of 49.4 years and a median age of 49.0 years. Primary caregivers were 42% biological parents, 28% grandparents, 13% aunts and uncles, 6% siblings, 3% cousins and the rest a mix of great-grandparents, step-parents, foster-parents, teachers and neighbors.

3.4. Simultaneous Confirmatory Factor Analysis (SCFA) and internal consistency

Adolescents. For each type of maltreatment, relevant items were constrained to load onto that factor. Consistent with many published CFA analyses, a pre-specified model did not fit the data well (CFI .794, TLI .766, RMSEA .054, SRMR .067), so modifications were carried out (Brown, 2015). Upon further examination, two items were removed as they did not meet the pre-specified loading cut-off of > .4 (see Brown, 2015). The first item measured medical neglect as 'not being cared for or taken to the doctor when injured or ill'. Inspection of wording confirmed that the first item was ambiguously phrased in relation to neglect as it could equally measure poverty and that the amendment to the item stating 'despite there being enough money to do so' was erroneously omitted in the adolescent questionnaire. The second item measured sexual abuse: 'being forced to participate in a sex video'. The meaning of the item was considered to be ambiguous. Adolescents may have wanted to engage in sexual activity with their partner but may not have wanted to be filmed doing it and this item may not fit with the underlying construct of the other items in the contact sexual abuse category. Further re-specifications in relation to covariances between the random measurement errors (15 adolescents; 4 caregivers)

Table 2
Socio-demographic characteristics of the adolescent-caregiver sample by respondent in the cluster RCT (N = 1104).

	Adolescent (n = 552) N (%) or Mean (SD)	Caregiver (n = 552) N (%) or Mean (SD)
Age	13.8 years (2.39)	49.4 years (14.69)
Female	228 (41.3)	523 (94.7)
Caregiver is biological mother or father of adolescent	–	230 (41.7)
Child orphaned	–	146 (26.5)
Not able to afford 2+ necessities	–	387 (70.2)
Enrolled in school	526 (95.3)	–
Caregiver relationship status		
Single	–	210 (38.0)
Have boyfriend/girlfriend	–	37 (6.7)
Cohabiting or married	–	168 (30.4)
Married but not cohabiting	–	30 (5.4)
Divorced	–	8 (1.4)
Widowed	–	98 (17.8)
Highest level of education completed		
No schooling	–	20 (3.6)
Some primary school	–	120 (21.7)
Completed primary school	–	208 (37.7)
Completed high school	–	130 (23.6)
Passed matric	–	72 (13.0)

were carried out using both modification indices with expected parameter changes and plausible theoretical reasons to correlate error terms (Brown, 2015; Byrne, 2012; Saris, Satorra, & van der Veld, 2009). Results of the final CFA model for adolescents are presented in Table 3. Model fit indices suggest that model fit was adequate (CFI 0.925, TLI 0.908, RMSEA 0.035 and SRMR 0.052). Standardized factor loadings of indicator variables onto latent constructs were strong for all six dimensions ranging from $\beta = .43$ to $\beta = .93$. Correlations among the latent constructs of physical abuse, emotional abuse, witnessing IPV and neglect were positive and statistically significant, with moderate to large effect sizes and consistent with *a priori* expectations. Sexual harassment was positively correlated with emotional abuse, witnessing IPV and neglect with small effect sizes. It did not correlate with physical or contact sexual abuse. Contact sexual abuse only correlated with neglect with a small positive effect size (Table 3). Supplement 5 summarizes individual item wording, response options and frequencies for all indicators that were included in the CFA for adolescents.

The final ICAST-Trial adolescent version consists of 25 items; 4 items for physical abuse ($\alpha = .88/ \rho = .85$), 8 items for emotional abuse ($\alpha = .81/ \rho = .76$), 2 items for witnessing IPV ($\alpha = .67/ \rho = .68$), 3 items for sexual harassment ($\alpha = .75/ \rho = .73$), 3 items for contact sexual abuse ($\alpha = .68/ \rho = .53$) and 5 items for neglect ($\alpha = .79/ \rho = .81$). Internal consistency based on Cronbach's α and Raykov's ρ therefore varied from questionable for witnessing IPV and contact sexual abuse to good for the rest of the subscales (Table 3).

Caregivers. For each type of abuse (i.e. physical, emotional, neglect) relevant items were constrained to load onto that factor. The pre-specified model did not fit the data well (CFI .779, TLI .741, RMSEA .058, SRMR .070). Modifications were therefore carried out as described above. Five items were removed as they did not meet the pre-specified standardized loading cut-off of > .4. Four items covered emotional abuse: 'shout or scream at teen', 'lock teen out of house', 'refuse to speak to teen' and 'tell teen that you wished he/she had never been born'. These were original, un-amended ICAST items. One neglect item was also removed: 'teen did not get the food and drink they needed even though there was money to pay for it'. Inspection of the wording of the items suggested some possible ambiguity in phrasing and interpretation. 'Shouting or screaming at teen' was a frequently endorsed item and may in the cultural context not tap into the domain of emotional abuse. 'Locking teen out of house' was one of the least endorsed items with less than 5% of caregivers reporting this, possibly generating too little variance in the model. 'Refusing to speak to teen' is not an action which involves abusive language or emotional threat and thus may not tap into the underlying emotional abuse construct. No such ambiguity could be found with regards to the frequently endorsed item 'tell teen that you wished he/she had never been born'. Inspection of the wording for the neglect item found ambiguity in that this could also be understood as withholding a meal to punish the child. One emotional abuse item cross-loaded onto the neglect construct 'threatening to invoke ghosts or evil spirits'.

Results of the final CFA model for caregivers are presented in Table 4. Model fit indices suggest that the model fit the data well (CFI .975, TLI .965, RMSEA .025, SRMR .036). Standardized factor loadings of indicator variables on latent constructs were good for all four dimensions ranging from $\beta = .44$ to $\beta = .94$ except for the cross-loading indicator $\beta = 0.39$. Correlations among latent constructs were significant for physical, emotional and sexual abuse with small to large effect sizes ($r = .172$ to .763) and positive as per a priori expectations. Emotional abuse did not correlate with neglect (Table 4). Supplement 5 summarizes individual item response options and frequencies for all indicators that were included in the CFA for caregivers. There were no missing values.

The final ICAST-Trial caregiver version consists of 14 items: 6 items for physical abuse ($\alpha = .84/ \rho = .80$), 4 items for emotional abuse ($\alpha = .62/ \rho = .65$), 2 items for contact sexual abuse ($\alpha = .62/ \rho = .74$) and 2 items for neglect ($\alpha = .58/ \rho = .67$). Internal consistency based on Cronbach's α and Raykov's ρ ranged from poor for emotional, neglect and contact sexual abuse to good for physical abuse (Table 4).

Table 3
Standardized results of the Confirmatory Factor Analysis of the ICAST-Trial for South African adolescents in the cluster RCT (n = 552).

	Physical Abuse		Emotional Abuse		Witnessing IPV		Sexual Harassment		Contact Sexual Abuse		Neglect	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.			β	S.E.
Push, grab or kick you	0.872***	0.04										
Shake you	0.873***	0.03										
Hit, beat or spank you with a hand	0.748***	0.06										
Hit, beat or spank you with an object	0.689***	0.06										
Scream at you loudly and aggressively			0.462***	0.05								
Call you names, say mean things or swear at you			0.671***	0.04								
Make you feel ashamed in front of other people			0.683***	0.04								
Say that they wished you were dead or had never been born			0.678***	0.07								
Threaten to leave you forever or abandon you			0.666***	0.07								
Lock you out of the home for a long time			0.487***	0.09								
Threaten to call evil spirits against you			0.554***	0.09								
Refuse to speak to you because they were angry with you			0.595***	0.06								
Adults shouting at each other in the home					0.729***	0.08						
Adults hitting each other in the home					0.703***	0.08						
Make you upset by speaking or texting sexual things							0.628***	0.10				
Make you watch sex video or at pictures							0.835***	0.13				
Make you look at their private parts or looked at yours							0.703***	0.12				
Touch your private parts or made you touch theirs									0.568***	0.20		
Try to have sex with you when you did not want to									0.931***	0.06		
Have sex with you when you did not want to									0.517***	0.19		
Not get enough to eat or drink even though there was enough for everyone											0.433***	0.08
Not feel cared for											0.731***	0.06
Felt you were not important											0.771***	0.05
Felt there was no-one looking after you and supporting you											0.860***	0.04
Get seriously hurt or injured because nobody looked after you											0.495***	0.10
Physical abuse[a]	1											
Emotional abuse[a]	0.653***	0.07	1									
Witnessing IPV[a]	0.462***	0.09	0.512***	0.09	1							
Sexual harassment[a]	0.229	0.15	0.332***	0.07	0.264***	0.09	1					
Contact sexual abuse[a]	0.042	0.03	0.082	0.06	0.106	0.06	0.334	0.20	1			
Neglect[a]	0.530***	0.08	0.793***	0.06	0.418***	0.08	0.358***	0.11	0.168***	0.07	1	
Internal consistency	α = 0.88	ρ = 0.85	α = 0.81	ρ = 0.76	α = 0.67	ρ = 0.68	α = 0.75	ρ = 0.73	α = 0.68	ρ = 0.53	α = 0.79	ρ = 0.81

Note: *** shows significant correlations at $p < 0.05$.
Model fit: CFI 0.925, TLI 0.908, RMSEA 0.035 and SRMR 0.052, AIC 39,847.892, BIC 40,300.815.
[a] shows Pearson correlations.

Table 4
Standardized results of the confirmatory factor analysis of the ICAST-Trial for South African caregivers in the cluster RCT (n = 552).

	Physical Abuse		Emotional Abuse		Contact Sexual Abuse		Neglect	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Shake him or her	0.649***	0.06						
Hit with an object such as stick or belt	0.557***	0.06						
Hit on face or head with your hand	0.806***	0.05						
Push, grab or kick	0.761***	0.06						
Hit, beat, slap or spank with bare hand	0.721***	0.06						
Hit over and over again	0.712***	0.07						
Threaten to abandon			0.440***	0.09				
Threaten to invoke ghosts or evil spirits			0.528***	0.16			0.385***	0.17
Withhold a meal to punish teen			0.556***	0.10				
Insult or call them names			0.752***	0.10				
Was touched by an adult or older child in a sexual way					0.495***	0.19		
Was forced to have sex by an adult or older child					0.900***	0.09		
Did not get medical care for injury or illness even though there was money to pay for it							0.547***	0.11
Did not get food or drink even though there was money to pay for it							0.938***	0.08
Physical abuse[a]	1							
Emotional abuse[a]	0.432***	0.08	1					
Contact sexual abuse[a]	0.172***	0.09	0.342***	0.17	1			
Neglect[a]	0.209***	0.08	0.275	0.17	0.763***	0.19	1	
Internal consistency	α = 0.84	ρ = 0.80	α = 0.62	ρ = 0.65	α = 0.62	ρ = 0.64	α = 0.58	ρ = 0.67

Note: *** shows significant correlations at $p < 0.05$.
Model fit: CFI 0.975, TLI 0.965, RMSEA 0.025, SRMR 0.036, AIC 17,254.474, BIC 17,483.092.
[a] shows Pearson correlations.

3.5. Concurrent criterion validity

Correlations testing concurrent criterion validity confirmed hypothesized relationships for the most part, but with often unexpectedly small correlations, particularly for caregivers (Table 5).

Adolescent-reported: Correlations among the different abuse constructs, depressive symptoms, externalizing behavior, suicidal ideation and substance use were small to moderate. No health or behavioral factors were associated with sexual harassment. Contact sexual abuse was only associated with externalizing behavior. Small to moderate correlations were also found between different abuse constructs and the APQ Corporal Punishment subscale.

Caregiver-reported: Correlations among the different abuse constructs and caregiver depressive symptoms, caregiver childhood abuse and caregiver reported adolescent externalizing behavior were small. Caregiver substance abuse was not associated with caregiver reported abuse. Small to moderate correlations were also found between physical and emotional abuse and the APQ Corporal Punishment subscale. Considering only 42% of primary caregivers were biological parents, sub-group analyses for the three largest caregiver groups (biological parents, grandparents and aunts/uncles) were carried out showing similar patterns (Supplement 6).

3.6. Sensitivity to change

At baseline, differences in means between intervention and control group could be observed for caregiver reported neglect and contact sexual abuse using Wilcoxon rank sum tests, while no differences were observed for the other abuse sub-scales (Table 6). At 1 month and 5–9-month follow-up, the intervention group reported reductions in physical and emotional abuse (caregiver and adolescent report) and neglect and sexual harassment (adolescent report), while no significant reductions were reported in the control group. These results do not examine treatment effects but demonstrate that this measure can be sensitive to detect change over time. Results for the cluster RCT are published elsewhere using intention-to-treat analysis with hierarchical negative Poisson regressions (Cluver et al., 2018).

4. Discussion

In the past two decades there have been significant advances globally to improve the quality of measurement of childhood violence and neglect. Much of this effort has focused on development and refinement of tools for epidemiological and clinical research, and monitoring of abuse and neglect via official systems. Compared to the 1980 s and 1990 s, it is now possible to describe the nature, scale and social variation in child maltreatment (c.f. Hillis et al., 2016; Ward et al., 2018). To date however, many of the

Table 5
Concurrent validity testing of for the ICAST-Trial among South African adolescents and caregivers in the cluster RCT(N = 1104).

Adolescent reported (n = 552)						Caregiver reported (n = 552)				
	Depressive symptoms	Suicidal ideation	Externalizing behavior	Adolescent substance use	Corporal Punishment	Caregiver Depressive symptoms	Caregiver childhood abuse	Adolescent externalizing behavior	Caregiver substance use	Corporal Punishment
Physical abuse	.221***	.233**	.145*	.008	.500***	.082	.195**	.181***	0.028	.457***
Emotional abuse	.187**	.259**	.302***	.138*	.357***	.088*	.153**	.299***	0.043	.181***
Witnessing IPV	.215***	.238***	.369***	.076	.310***	–	–	–	–	–
Sexual harassment	.034	.126	.103	.034	.184*	–	–	–	–	–
Contact sexual abuse	−.028	.030	.126**	.080**	.047	.050*	−0.007	0.142***	−.036	.034
Neglect	.155**	.225**	.258***	.114*	.244***	0.003	−0.003	0.112**	−.037	.037

Note: * shows significant correlations at $p < 0.05$, ** $p < .01$, ***$p < .001$.

Table 6
Differences in means at baseline and immediate post-test between adolescent and caregiver reported outcomes in the cluster RCT (N = 1104).

	Adolescents (n = 512)			Caregivers (n = 505)		
Baseline	Treatment group (n = 244)	Control group (n = 268)	z(p)	Treatment group (n = 240)	Control group (n = 265)	z(p)
Physical abuse	2.40 (4.87)	2.72 (5.10)	−.72 (.471)	3.23 (5.68)	2.90 (5.43)	−.74 (.460)
Emotional abuse	6.55 (9.71)	6.03 (8.47)	−.37 (.713)	1.41 (3.30)	1.09 (2.59)	−1.04 (.297)
Neglect	2.90 (5.91)	2.09 (4.90)	−3.15 (.002)	.37 (1.53)	.07 (.49)	−2.92 (.004)
DV	2.50 (3.46)	2.57 (3.80)	−.79 (.430)	–	–	–
Sex. harassment	.61 (2.48)	.46 (1.72)	−.79 (.427)	–	–	–
Sexual Abuse	.18 (.80)	.19 (1.42)	−1.34 (.180)	.17 (.91)	.05 (.23)	−2.33 (.020)
Differences in means at post-test between adolescent and caregiver reported outcomes						
Outcome	Treatment group (n = 244)	Control group (n = 268)	z(*p*)	Treatment group (n = 240)	Control group (n = 265)	z(*p*)
Physical abuse[a]	1.08 (2.67)	2.14 (4.31)	−3.60 (< .001)	.70 (3.01)	1.89 (4.96)	−5.16 (< .001)
Emotional abuse[a]	4.51 (6.88)	5.69 (7.72)	−2.26 (.024)	.49 (1.48)	1.49 (3.09)	−5.34 (< .001)
Neglect[b]	1.83 (4.97)	.81 (3.12)	−3.52 (< .001)	.05 (.34)	.05 (.23)	−.72 (.471)
DV[b]	1.35 (2.45)	1.32 (2.36)	−.26 (.789)	–	–	–
Sex. harassment[b]	.31 (1.12)	.09 (.55)	−2.71 (.007)	–	–	–
Sexual abuse[b]	.08 (.53)	.05 (.28)	−.51 (.612)	.02 (.18)	.01 (.09)	−.95 (.344)

Data describe mean, standard deviation, Wilcoxon rank-sum z-test (*p*-value).
[a] measured at 1-month post intervention.
[b] measured at 5–9 months post intervention.

measures used in this field have not been designed for, or are not readily applicable to, assessing change over time in response to preventive interventions. There is a particular need for brief, culturally sensitive and easy-to-administer tools that can be applied to evaluate the effectiveness of violence prevention programs in LMICs.

To our knowledge, the ICAST-Trial tools are the first child abuse and neglect measures that have been culturally adapted and psychometrically tested in a middle-income country specifically to measure change in response to a preventive intervention. The study demonstrated sensitivity to detect change in physical and emotional child abuse victimization and abusive behaviors by caregivers with considerable reductions post-intervention in both the pre-post pilot study and the cluster randomized trial.

It is important to consider whether these tools, adapted and tested in the South African context, could be applied to intervention research and community program evaluation more broadly. Although many of the abusive and neglectful acts and social conditions experienced by children appear common across all countries, there are significant sociocultural differences (Hillis et al., 2016; Norman et al., 2012). While child maltreatment occurs everywhere, its form is inherently variable. As Runyan et al. (2015) suggested, researchers should always engage in some level of qualitative critical appraisal prior to using the ICAST tools in new contexts (with, at the very least, focus group discussions with the target groups and local advisors). The process of critical reflection described in Phase Two of this study may be helpful for those considering the ICAST-Trial tools to evaluate intervention programs.

The respondent debriefing enabled us to incorporate culturally appropriate vignettes and face valid items. The original ICAST parent and adolescent versions underwent seven substantial changes relating to item removal and item rephrasing. First, three items were removed after the pilot due to very low response rates related to the very severe nature of the physical abuse (2 items) and cultural irrelevance (1 item). Second, after the qualitative phase, two further items were removed due to cultural irrelevance. Third, items that were felt to be repetitive were combined into one. Fourth, one item on 'forced sex' was added to the adolescent version as this previously only had an item on 'attempted forced sex'. Fifth, neglect items were also modified following the qualitative phase to allow distinction between neglect and financial inability to provide. This is particularly salient for low-income contexts as previous research in high income countries has demonstrated the difficulty of disentangling poverty driven and parental driven neglect (Slack, Holl, Altenbernd, McDaniel, & Stevens, 2003) due to higher likelihood of poor and single parent households being identified as neglectful (Bywaters et al., 2016). Sixth, two items had to be removed from the adolescent version and five items from the caregiver version as they did not load with sufficient strength onto their respective constructs. Four of these were related to emotional abuse, which halved the number of emotional abuse items in the caregiver version. The same items operated well in the adolescent version, which suggests that further qualitative work is needed around items in the caregiver questionnaire to establish whether their poor performance is due to ambiguous phrasing or due to cultural or societal differences in understanding or motivation for these behaviors. Seventh, vignettes were modified following requests from participants for culturally sensitive and suitable introductions to the questions which were age and contextually appropriate.

The two ICAST-Trial measures have good psychometric properties. The analysis of concurrent criterion validity shows patterns consistent with hypothesized associations. Among adolescents, physical and emotional abuse, witnessing IPV and neglect were correlated with adolescent depressive symptoms and suicide ideation as expected (Norman et al., 2012), but contact sexual abuse unexpectedly was correlated with neither depressive symptoms nor suicide ideation (Maniglio, 2009). This lack of correlation may be due to small numbers of children reporting past month contact sexual abuse and the resulting lack of statistical power. All types of abuse, except for sexual harassment, correlated with adolescent externalizing behavior. Cross-validation with the Corporal

Punishment sub-scale of the APQ showed expected associations between physical abuse, emotional abuse, neglect and witnessing IPV and corporal punishment. Unexpectedly, adolescent substance use was not correlated with physical abuse, in contrast to the existing literature (Norman et al., 2012). Witnessing IPV or sexual harassment were also not associated with adolescent substance use and these results may have been due to low levels of reported substance use among adolescents.

Among caregivers, associations between ICAST-Trial constructs and hypothesized factors also indicate concurrent criterion validity. Caregiver depressive symptoms were associated with caregiver reported emotional abuse and sexual abuse but not physical abuse or neglect. Previous studies found no consistent evidence of associations in South Africa (Meinck, Cluver, Orkin, et al., 2017), which is quite different from trends in several high income countries where caregiver depression is a major risk factor for child abuse (Chaffin, Kelleher, & Hollenberg, 1996; Conron, Beardslee, Koenen, Buka, & Gortmaker, 2009). Further research is needed in South Africa and similar socioeconomic and cultural contexts into links between parental depression, parenting difficulties and child maltreatment. Caregiver history of childhood abuse correlated with physical and emotional abuse but not sexual abuse or neglect which supports tentative findings on the intergenerational transmission of harsh parenting (Fulu et al., 2017). Caregiver reported adolescent externalizing behavior was correlated with physical, emotional and sexual abuse and neglect. Cross-validation with the Corporal Punishment sub-scale of the APQ showed associations with physical and emotional abuse. Contrary to previous research, caregiver substance use was not associated with any of the measured abuse types (Meinck et al., 2015) and this may have been due to underreporting of substance use among caregivers. Overall concurrent validity testing indicated construct validity for the ICAST-Trial caregiver and adolescent versions as ICAST-Trial constructs were correlated in the expected direction and expected magnitude with mental distress and behavioral problems as well as the APQ Corporal Punishment subscale. No previous studies of the ICAST-P have examined concurrent criterion validity and thus further research is needed to replicate these findings.

The data also show that physical, emotional, and sexual abuse, witnessing IPV and neglect are independent but correlated constructs in the adolescent version. Physical and emotional abuse and neglect were highly correlated (> 0.6) which is in line with previous research also using the ICAST (Chang et al., 2013). In the caregiver version, physical and sexual abuse were independent constructs, whereas one of the emotional abuse items ('threaten to invoke ghosts') cross-loaded onto neglect. Neglect and contact sexual abuse were highly correlated ($> .7$) whereas all other correlations among constructs were considerably smaller. This is unsurprising considering that sexual abuse is often associated with a lack of parental supervision (Crosson-Tower, 2014).

This research is subject to a number of limitations. First, as these data stem from a randomized trial with three waves of data collection, we were mindful of the need to minimize respondent burden, so we did not attempt to measure test-retest reliability. Second, although the questionnaires were extensively piloted, cognitive interviewing (in-depth probing of the understanding of each question to assess response error; Bode & Jansen, 2013) was not conducted. We also did not determine whether there are ambiguities in phrasing and translation in the final version. Third, we were unable to ask adolescents about their emotional reactions to the interviews, or discuss with caregivers how they felt about being asked questions about their potentially abusive behavior towards children in their care. Considering the substantial differences in prevalence between adolescent and caregiver reports, in-depth qualitative work should be done to elucidate reasons for differences in disclosure. Fourth, the research used adolescent and caregiver self-report which may be prone to social desirability bias (Tourangeau & Yan, 2007). However, agency data is not routinely collected in South Africa (or many other LMIC) and few child abuse victims access formal services (Meinck, Cluver, Loening-Voysey, et al., 2017). Fifth, this study did not test measurement invariance across caregiver genders due to the relatively small number of male participants. It is possible that the psychometric properties are different for male and female caregivers.

Sixth, the ICAST-Trial uses a modified version of the response frame which measures past month exposure as opposed to past-year and lifetime exposure as in the original ICAST. This has implications for interpretation of differences across studies in the validity and reliability of the measure. Seventh, the ICAST-Trial concurrent criterion validity testing was carried out using self-report data only and showed very small correlations with criterion measures. Future studies should use data collected by other means (i.e. child protection reports, health services data and direct observation) for validation of child safety outcomes, especially when trials are conducted with large samples and over longer time periods. We recognize that this data may be very difficult to obtain in low-resource settings with limited services. Further testing on concurrent criterion validity is also needed in relation to the small effect sizes presented in this study.

Finally, the various sub-scales had mixed internal consistency. In particular, the emotional and sexual abuse and neglect subscales in the caregiver version and contact sexual abuse and witnessing IPV subscales in the adolescent version showed low internal consistency. This is not surprising for the neglect and sexual abuse and witnessing IPV sub-scales which only contain three and two items respectively. Cronbach's α is affected by the number of items within each sub-scale and thus these lower alpha values may be a reflection of too few items in the measure (Tavakol & Dennick, 2011). For this reason, Raykov's rho (ρ) was also calculated which showed similar levels of internal consistency. Low internal consistency of the emotional abuse sub-scale for caregivers and the contact sexual abuse sub-scale for adolescents is a concern particularly as this result differs from prior research on the ICAST (Runyan et al., 2009; Zolotor et al., 2009). Future studies should address these issues, including exploring whether the low internal consistency of certain subscales is an artefact of the particular culture in which we were working, or a different psychometric matter.

Overall, this study suggests that the ICAST-Trial is a valid measure of physical, emotional and sexual abuse and neglect (both for parents and adolescents), and witnessing IPV and sexual harassment (adolescent version), although further external validation is required. In particular, we suggest caution in the interpretation of the evidence on criterion-related validity, as the correlations generally are small. The high rates of disclosure of past month abusive behavior and insights gained from the participant interviews suggest that the ICAST-Trial is a culturally acceptable measure for the context in which it was used. While the Cronbach's α was lower than is generally regarded as acceptable for some subscales, the factor structure remains stable across samples, correlations among subscales are appropriately strong, and correlations with criterion measures exist although smaller than expected. The measure

addresses a need for freely available, validated child abuse measures for intervention studies which are sensitive to detect change in abusive behaviors.

Author contributions

FM and LC designed the cluster RCT and managed the data collection. SDS conducted the qualitative piloting and developed the AMASI component with guidance from FM. FM conceptualized this present study and had the responsibility for conceptualizing and writing the paper. FM led and conducted the analyses with support from MB and PS. LC, MB, CW, PS, SDS and MD all contributed to the interpretation of findings and the structure of the paper. All authors reviewed and approved the final version.

Acknowledgements

The study was funded by the Economic and Social Research Council under a Future Research Leader Award [ES/N017447/1] to the first author. The Sinovuyo Teen study, from which the data stem, was funded by the European Research Council under the European Union's Seventh Framework Programme [FP7/2007-2013, grant agreement 313421], the United Nations Children's Fund Office of Research Innocenti [2220A009001002], the John Fell Fund [103/757], the Leverhulme Trust [PLP-2014-095] and the University of Oxford's ESRC Impact Acceleration Account [1602-KEA-189; 1311-KEA-004 & 1609-GCRF-227]. The authors wish to thank all the families in the Eastern Cape who participated in the research and the research assistants who worked tirelessly to gather all the data. Special thanks to Vanessa Picker for proof-reading and editing.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.chiabu.2018.05.022.

References

Achenbach, T. (2000). Child behaviour checklists (CBCL/2-3 and CBCL/4-18), teacher report form (TRF) and youth self-report (YSR). In J. Rush, M. First, & D. Blacker (Eds.). *The handbook of psychiatric measures*(1st ed.). Arlington, VA: The American Psychiatric Association.

Al-Eissa, M. A., AlBuhairan, F. S., Qayad, M., Saleheen, H., Runyan, D., & Almuneef, M. (2015). Determining child maltreatment incidence in Saudi Arabia using the ICAST-CH: A pilot study. *Child Abuse & Neglect, 42*, 174–182. http://dx.doi.org/10.1016/j.chiabu.2014.08.016.

Almuneef, M., Qayad, M., Aleissa, M., & Albuhairan, F. (2014). Adverse childhood experiences, chronic diseases, and risky health behaviors in Saudi Arabian adults: A pilot study. *Child Abuse & Neglect, 38*(11), 1787–1793. http://dx.doi.org/10.1016/j.chiabu.2014.06.003.

Auspurg, K., & Hintz, T. (2015). *Factorial survey experiments.* Witney: Sage.

Barnes, H., & Wright, G. (2012). Defining child poverty in South Africa using the socially perceived necessities approach'. In A. Minujin, & S. Nandy (Eds.). *Global child poverty and well-being: Measurement, concepts, policy and action* (pp. 135–154). Bristol: Policy Press.

Bernstein, D., & Fink, L. (1997). *Child trauma questionnaire: A retrospective self-report*Massachusetts: Pearson Education.

Bode, C., & Jansen, H. (2013). Examining the personal experience of aging scale with the three step test interview. *Methodology, 9*(3), 96–103.

Bowen, N., & Guo, S. (2012). *Structural equation modeling.* Oxford: Oxford University Press.

Boyes, M., & Cluver, L. (2013). Performance of the revised children's manifest anxiety scale in a sample of children and adolescents from poor urban communities in Cape Town. *European Journal of Psychological Assessment, 29*, 113–120.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research.* New York: Guildford Press.

Byrne, B. (2012). *Structural equation modeling with MPlus.* New York: Routledge.

Bywaters, P., Bunting, L., Davidson, G., Hanratty, J., Mason, W., McCartan, C., ... Steils, N. (2016). *The relationship between poverty, child abuse and neglect: An evidence review.* York.

Chaffin, M., Kelleher, K., & Hollenberg, J. (1996). Onset of physical abuse and neglect: Psychiatric, substance abuse, and social risk factors from prospective community data. *Child Abuse & Neglect, 20*(3), 191–203.

Chang, H.-Y., Lin, C.-L., Chang, Y.-T., Tsai, M.-C., & Feng, J.-Y. (2013). Psychometric testing of the Chinese version of ISPCAN child abuse screening tools children's home version (ICAST-CH-C). *Children and Youth Services Review, 35*(12), 2135–2139. http://dx.doi.org/10.1016/j.childyouth.2013.10.020.

Cluver, L., Gardner, F., & Operario, D. (2007). Psychological distress amongst AIDS-orphaned children in urban South Africa. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 48*(8), 755–763.

Cluver, L., Meinck, F., Shenderovich, Y., Ward, C. L., Herrero Romero, R., Redfern, A., ... Lechowicz, M. (2016). A parenting programme to prevent abuse of adolescents in South Africa: A study protocol for a randomised controlled trial. *Trials, 17*(1), 328.

Cluver, L., Meinck, F., Steinert, J., Shenderovich, Y., Doubt, J., Lombard, C., ... Hoeksma, S. (2018). Parenting for lifelong health: A pragmatic cluster randomised trial of a non-commercialised parenting programme for adolescents and their families in South Africa. *BMJ Global Health, 3*(1), e000539.

Cluver, L., Meinck, F., Yakubovich, A., Doubt, J., Redfern, A., Ward, C. L., & Grimes, D. (2016). Reducing child abuse amongst adolescents in low- and middle-income countries: A pre-post trial in South Africa. *BMC Public Health, 16*(1), 567.

Cluver, L., Orkin, F., Boyes, M., & Sherr, L. (2015). Child and adolescent suicide attempts, suicidalbehavior, and adverse childhood experiences in South Africa: A prospective study. *Journal of Adolescent Health, 57*(1), 52–59.

Conron, K. J., Beardslee, W., Koenen, K. C., Buka, S. L., & Gortmaker, S. L. (2009). A longitudinal study of maternal depression and child maltreatment in a national sample of families investigated by child protective services. *Archives of Pediatrics & Adolescent Medicine, 163*(10), 922. http://dx.doi.org/10.1001/archpediatrics.2009.176.

Crosson-Tower, C. (2014). *Confronting child and adolescent sexual abuse.* Thousand Oaks, CA, US: SAGE Publications Inc.

Dunne, M. P., Zolotor, A. J., Runyan, D. K., Andreva-Miller, I., Choo, W. Y., Dunne, S. K., ... Menick, D. M. (2009). ISPCAN child abuse screening tools retrospective version (ICAST-R): Delphi study and field testing in seven countries. *Child Abuse & Neglect, 33*, 826–832. http://dx.doi.org/10.1016/j.chiabu.2009.09.005.

Eastern Cape Socio Economic Consultative Council (2011). *Service delivery and conditions of living in the Eastern Cape.* Vincent.

Faulbaum, F., & Prüfer, P. (2009). *Was ist eine Frage? Was ist eine gute Frage?* Wiesbaden: VS Verlag für Sozialwissenschaftenhttp://dx.doi.org/10.1007/978-3-531-91441-1_1.

Felitti, V., Anda, M., Nordenberg, D., Williamson, D., Spitz, A., Edwards, V., ... Marks, J. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventative Medicine, 14*, 245–258. http://dx.doi.org/10.1016/S0749-3797(98)00017-8.

Fergusson, D. M., Horwood, L. J., & Woodward, L. J. (2000). The stability of child abuse reports: A longitudinal study of the reporting behaviour of young adults. *Psychological Medicine, 30*, 529–544.

Finkelhor, D., Ji, K., Mikton, C., & Dunne, M. (2013). Explaining lower rates of sexual abuse in China. *Child Abuse & Neglect, 37*(10), 852–860. http://dx.doi.org/10.1016/j.chiabu.2013.07.006.

Frick, P. J. (1991). *Alabama parenting questionnaire*.

Fulu, E., Miedema, S., Roselli, T., McCook, S., Chan, K. L., Haardörfer, R., ... Johnson, S. (2017). Pathways between childhood trauma, intimate partner violence, and harsh parenting: Findings from the UN multi-country study on men and violence in Asia and the Pacific. *The Lancet Global Health, 5*(5), e512–e522. http://dx.doi.org/10.1016/

S2214-109X(17)30103-1.
Gnambs, T., & Kaspar, K. (2015). Disclosure of sensitive behaviors across self-administered survey modes: A meta-analysis. *Behavior Research Methods, 47*(4), 1237–1259. http://dx.doi.org/10.3758/s13428-014-0533-4.
Hartung, C., Anokwa, Y., Brunette, W., Lerer, A., Tseng, C., & Borriello, G. (2010). Open data kit: Tools to build information services for developing regions. *4th International Conference on Information and Communication Technologies and Development, ICTD*.
Hillis, S., Mercy, J., Amobi, A., & Kress, H. (2016). Global prevalence of past-year violence against children: A systematic review and minimum estimates. *Pediatrics, 137*(3), e20154079. http://dx.doi.org/10.1542/peds.2015-4079.
Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., ... Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. *The Lancet Public Health, 2*(8), e356–e366. http://dx.doi.org/10.1016/S2468-2667(17)30118-4.
Iovu, M. (2012). The potential of ISPCAN child abuse screening tool children's version (ICAST-CH) for mapping child maltreatment experiences. In E. Dulama, T. Valcan, & M. Ciocian (Eds.). *Perspective asupra problematicolor din domeniul educatiei - cercetari si aplicatii* (pp. 7–22). Cluj-Napoca: Presa Universitara Clujeana.
Korbin, J. (1980). The cultural context of child abuse and neglect. *Child Abuse & Neglect, 4*(1), 3–13. http://dx.doi.org/10.1016/0145-2134(80)90028-9.
Kovacs, M. (1985). The children's depression, inventory (CDI). *Psychopharmacology Bulletin, 21*(4), 995–998.
Kuo, C., Operario, D., & Cluver, L. (2012). Depression among carers of AIDS-orphaned and other-orphaned children in Umlazi Township, South Africa. *Global Public Health, 7*, 253–269. http://dx.doi.org/10.1080/17441692.2011.626436.
Maier, T., Mohler-Kuo, M., Landolt, M. A., Schnyder, U., & Jud, A. (2013). The tip of the iceberg. Incidence of disclosed cases of child sexual abuse in Switzerland: Results from a nationwide agency survey. *International Journal of Public Health, 58*(6), 875–883. http://dx.doi.org/10.1007/s00038-013-0498-6.
Maniglio, R. (2009). The impact of child sexual abuse on health: A systematic review of reviews. *Clinical Psychology Review, 29*(7), 647–657. http://dx.doi.org/10.1016/j.cpr.2009.08.003.
Martin, E. (2004). *Vignettes and respondent debriefing for questionnaire design and evaluation. Methods for testing and evaluating survey questionnaires*. Hoboken, NJ, USA: John Wiley & Sons, Inc149–171. http://dx.doi.org/10.1002/0471654728.ch8.
Meinck, F., Cluver, L., Boyes, M., & Loening-Voysey, H. (2016). Physical, emotional and sexual adolescent abuse victimisation in South Africa: Prevalence, incidence, perpetrators and locations. *Journal of Epidemiology and Community Health, 70*, 910–916. http://dx.doi.org/10.1136/jech-2015-205860.
Meinck, F., Cluver, L., Boyes, M., & Mhlongo, E. (2015). Risk and protective factors for physical and sexual abuse of children and adolescents in Africa: A review and implications for practice. *Trauma, Violence, & Abuse, 16*(1), 81–107. http://dx.doi.org/10.1177/1524838014523336.
Meinck, F., Cluver, L., Loening-Voysey, H., Bray, R., Doubt, J., Casale, M., & Sherr, L. (2017). Disclosure of physical, emotional and sexual child abuse, help-seeking and access to abuse response services in two South African Provinces. *Psychology, Health & Medicine, 22*(Supl 1), 94–106. http://dx.doi.org/10.1080/13548506.2016.1271950.
Meinck, F., Cluver, L., Orkin, F., Kuo, C., Sharma, A., Hensels, I., ... Sherr, L. (2017). Pathways from family disadvantage via harsh parenting and caregiver mental health distress to adolescent health risks in South Africa. *Journal of Adolescent Health, 60*(1), 57–64. http://dx.doi.org/10.1016/j.jadohealth.2016.08.016.
Meinck, F., Steinert, J. I., Sethi, D., Gilbert, R., Bellis, M., Mikton, C., ... Baban, A. (2016). *Measuring andmonitoring national prevalence of child maltreatment: A practical handbook.* Copenhagen: World Health Organization Regional Office for Europe.
Mikton, C., & Butchart, A. (2009). Child maltreatment prevention: A systematic review of reviews. *Bulletin Of The World Health Organization, 87*, 305–324.
Mitwalli, S., Amro, Z., Hamayel, L., Hammoudeh, D., Imseeh, S., Rabia, Y., ... Giacaman, R. (2017). Cultural appropriateness of International child abuse screening tools for child abuse and neglect: A qualitative study. *The Lancet, 390*, S25. http://dx.doi.org/10.1016/S0140-6736(17)32026-3.
Muthen, B., & Muthen, L. (2012). *MPlus.* Los Angeles: Statmodel.
Nikolaidis, G., Petroulaki, K., Zarokosta, F., Tsirigoti, A., Hazizaj, A., Cenko, E., ... Browne, K. (2018). Lifetime and past-year prevalence of children's exposure to violence in 9 Balkan countries: The BECAN study. *Child and Adolescent Psychiatry and Mental Health, 12*(1), 1. http://dx.doi.org/10.1186/s13034-017-0208-x.
Norman, R. E., Byambaa, M., De, R., Butchart, A., Scott, J., & Vos, T. (2012). The long-term health consequences of child physical abuse, emotional abuse, and neglect: A systematic review and meta-analysis. *PLoS Medicine, 9*(11), e1001349. http://dx.doi.org/10.1371/journal.pmed.1001349.
Oladeji, B., Makanjoula, V., & Gureje, O. (2010). Family-related adverse childhood experiences as risk factors for psychiatric disorders in Nigeria. *British Journal of Psychiatry, 196*, 186–191.
Radloff, L. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401.
Raykov, T. (2004). Behavioral scale reliability and measurement invariance evaluation using latent variable modeling. *Behavior Therapy, 35*, 299–331.
Runyan, D., Brandspigel, S., Zolotor, A., & Dunne, M. (2015). *Manual for administration: The ISPCAN child aubse screening tool (ICAST).* Aurora, CO: International Society for the Prevention of Child Abuse and Neglect.
Runyan, D., Dunne, M. P., Zolotor, A. J., Madrid, B., Jain, D., Gerbaka, B., ... Youssef, R. M. (2009). The development and piloting of the ISPCAN child abuse screening tool-parent version (ICAST-P). *Child Abuse & Neglect, 33*(11), 826–832. http://dx.doi.org/10.1016/j.chiabu.2009.09.006.
Saris, W. E., Satorra, A., & van der Veld, W. M. (2009). Testing structural equation models or detection of misspecifications? *Structural Equation Modeling: A Multidisciplinary Journal, 16*(4), 561–582. http://dx.doi.org/10.1080/10705510903203433.
Sheehan, D. V., Shytle, R. D., & Milo, K. M. (2004). *MINI KID: Mini international neuropsychiatric interview for children and adolescents (English Ve).* Paris: Tampa and Hopital de la Salpetriere.
Silveira, A. L., da, S., & Grassi-Oliveira, R. (2016). Semantic validation of the ISPCAN child abuse screening tools (ICAST) in Brazilian Portuguese. *Trends in Psychiatry and Psychotherapy, 38*(2), 105–110. http://dx.doi.org/10.1590/2237-6089-2016-0012.
Slack, K., Holl, J., Altenbernd, L., McDaniel, M., & Stevens, A. (2003). Improving the measurement of child neglect for survey research: Issues and recommendations. *Child Maltreatment, 8*(2), 98–111. http://dx.doi.org/10.1177/1077559502250827.
StataCorp (2014). *Stata statistical software: Release 14.* College Station, TX: StataCorp LP.
Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child conflict tactics scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*, 249–270.
Sumner, S., Mercy, J., Saul, J., Motsa-Nzuza, N., Kwesigabo, G., Buluma, M., ... Hillis, S. (2015). Prevalence of sexual violence against children and use of social services — Seven countries, 2007–2013. *Morbidity and Mortality Weekly Report, 64*(12), 565–569.
Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 1*, 53–55.
Tourangeau, R., & Yan, T. (2007). Sensitive questions in surveys. *Psychological Bulletin, 133*(5), 859–883. http://dx.doi.org/10.1037/0033-2909.133.5.859.
Tran, Q., Dunne, M., Vo, T., & Luu, N. (2015). Adverse childhood experiences and the health of university students in eight provinces of Vietnam. *Asia Pacific Journal of Public Health, 27*(Suppl. 8), 26S–32S. http://dx.doi.org/10.1177/1010539515589812.
Usta, J., Farver, J., & Danachi, D. (2012). Child maltreatment: The Lebanese children's experiences. *Child: Care, Health and Development, 39*(2), 228–236.
Ward, C., Artz, L., Leoschut, L., Kassanjee, R., & Burton, P. (2018). Sexual violence against children in South Africa: A nationally representative cross-sectional study of prevalence and correlates. *The Lancet Global Health, 6*(4), e460–e468. http://dx.doi.org/10.1016/S2214-109X(18)30060-3.
Ward, C., Sanders, M. R., Gardner, F., Mikton, C., & Dawes, A. (2016). Preventing child maltreatment in low- and middle-income countries. *Child Abuse & Neglect, 54*, 97–107. http://dx.doi.org/10.1016/j.chiabu.2015.11.002.
WHO (2014). *Global Status report on violence prevention*Geneva: WHO.
WHO and CDC (2015). *Global school-based student health survey (GSHS).* Retrieved September 10, 2015, fromwww.cdc.gov/GSHS/.
World Bank (2018). *World Bank Country and lending groups.* Retrieved April 18, 2018, fromhttps://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups%0A%0A.
Zolotor, A. J., Runyan, D. K., Dunne, M. P., Jain, D., Péturs, H. R., Ramirez, C., ... Isaeva, O. (2009). ISPCAN child abuse screening tool children's version (ICAST-C): Instrument development and multi-national pilot testing. *Child Abuse & Neglect, 33*, 833–841. http://dx.doi.org/10.1016/j.chiabu.2009.09.004.